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attention in abnormal cases. They point out that the only writer upon the psychology of attention who has devoted thought and space to the question of the abnormal is Ribot, and they accordingly summarize the treatment of the subject found in the *Psychologie de l'attention* of that author. The body of the essay is then taken up with the exposition, along with more or less of running commentary, of the methods (reaction time, perimetrical measurement, mental work, fluctuation, æsthesiometry, etc.) employed by various investigators of abnormal attention from de Sanctis to Consoni, Marie, Wiersma, etc. Special chapters are assigned to the work of A. Rémond at Nancy (1888) and of Raymond and Janet at the Salpétrière. The names of experimenters, state of their subjects, and reported state of attention, are brought together in a useful chronological table on pp. 108-110. The authors phrase their conclusions as follows. (1) All states of intellectual inferiority, congenital or acquired, stationary or progressive, are accompanied by hypoprosexia. (2) Certain neuropathic states may be accompanied, at least momentarily and exceptionally, by a hyperprosexia, which is itself a condition and not a disease. (3) All mental disorders that take the form of delirium are characterized by paraprosexia. With the experimental means now at our disposal, we cannot give quantitative expression to these qualitatively different morbid or abnormal states of attention. (4) Distraction is either merely a transient hypoprosexia, or an incapacity of attention to maintain itself under some determinate form, *i.e.*, a mental disorientation.

It is clear that these conclusions are very general, and that they give us little insight into the mechanism of disordered attention. Of attention itself we are told only that it stands to the intelligence as reflex irritability stands to the nervous system, and that it presents many different aspects, according as it is spontaneous or voluntary, conscious or automatic, emotive or intellectual, and in these cases conscious or subconscious, etc. A deeper going analysis may be expected from the forthcoming *Psychologie de l'attention* by M. Rivière.

W. JENKINS.

Notes on the Development of a Child. II. *The Development of the Senses in the First Three Years of Childhood*, by MILICENT WASHBURN SHINN. The University Press, Berkeley, Cal., 1907. 258 p.

In this, the second volume of her Notes on the Development of a Child, Dr. Shinn has made a most important contribution to the psychology of infancy. While the source of the original data for the work, as in the case of the author's earlier publications, is the carefully kept record of her own observations upon her niece, this has been supplemented by not only the few scientific records which are available in printed form but by a number of manuscript records obtained through the agency of the Association of Collegiate Alumnæ, of whose child-study committee Dr. Shinn has for many years been chairman. The result of this carefully collated material is the most systematic and complete record of the development of the senses that has yet been contributed to psychology. In the introduction there is a brief discussion of the methods of child study, the principles of classification which have been used by different students of child psychology, including the author's own, of which the guiding idea is that of "*a progressive movement consisting of the integration of simpler activities into more complex and the differentiation of specialized ones out of generalized*, and an anticipatory summary of conclusions.

Under the principle above mentioned the book is divided into four parts. Part I deals with the sensibility of the new born, bringing together and tabulating for comparison the tests and observations of

the best workers in this field on visual, auditory, dermal, taste, smell, muscular, organic and general sensations. The following conclusions are reached.

The condition of the senses in normal infants at birth is as follows:

"1. *Sight* is only a dim and passive feeling of light and dark, without sense of distance or direction.

2. "*Hearing* appears with more or less delay and then only as a dull sensibility to auditory jar, rather than to sound.

"3. *Dermal feeling* includes a sensibility to *contact*, lively about the face (especially the lips and eyes) and duller over the rest of the body; a lively sensibility to decidedly *cold* touches though scarcely to diffused cold; and an exceedingly dull sensibility to pain."

"4. *Taste* and *smell* appear under normal conditions to be almost wholly wanting but can be excited by intensive artificial stimuli. There are also indications that taste, smell and touch are not perfectly differentiated.

5. "Sensations of *motion*, *muscular activity*, *fatigue* and *equilibrium*, *hunger*, *thirst* and *organic pain*, are distinctly felt, but are probably individually feeble. There may be also a faint undercurrent of *general sensation*.

"6. The content of consciousness in the new born is chiefly made up of the sensation of light and of touch and muscular sensations about the mouth and eyes."

These early experiences unassociated with each other or with reproductions of their earlier recurrence, represent the simplest form of consciousness and, since each has its own specific quality, furnish the material for the development of a complex psychic life. At this stage Dr. Shinn finds nothing that "parallels any phylogenetic stage of sense development though traces of the phylogenetic order are evident in the imperfect differentiation of smell, taste and touch, in the low sensibility, to dermal pain and the delayed appearance of cochlear hearing.

Part II discusses the synthesis of sense experience, through which the isolated sensations become fused, grouped and organized into a unified "stream of consciousness." The main lines of this fusion and grouping are as follows:

1. In eye movements, associations are formed between the muscular and visual sensations in the automatic movements of eyes, by means of which the power of voluntarily directing and accommodating the eyes to distance is attained and this is followed by the ability to trace outlines with the eyes leading to the perception of plane form, and rudimentary perceptions of distance, direction and objects as such.

2. During this same period a series of associations is formed between tactile and muscular sensations, especially those which occur in the automatic graspings of the mouth and hand, through which the power of active touch is attained.

3. By a complex process of association, the whole visual-motor group of sensations becomes linked with the tactile motor group experienced in grasping, and through this, aided by locomotion, the perception of solid form and the space-feeling itself are slowly acquired.

4. Auditory sensations become associated with visual and muscular sensations, and associations are also formed between sounds heard and the vocal organs producing them, thus laying the foundation for the development of speech. Admirable summaries and tables of the stages of learning to see, of the development of the active use of the touch organs, and their synthesis are given at the conclusion of these chapters. The development of the auditory sensations, the associ-

tion of sound with sight, and with sound-producing movements are likewise discussed in detail and short chapters are devoted to the associations of the minor special senses and to the development of the feeling of the bodily self, through the growing consciousness of muscular control, equilibrium feelings, exploration of the body surface and organic and general sensations.

Part III, deals with development in descrimination and interpretation and here comes the chapter on the development of color vision in infants, the largest contribution which has yet been made to this almost *terra incognita* of psychologists. As a result of her own observations and their agreement with the reports of other observers, Dr. Shinn concludes that, for at least three weeks after birth, a baby does not see color. Even after sensibility to light had become marked she found no reaction to even the most brilliant field of color. The questions next considered are: (1.) How long does this condition of color blindness last? (2.) By what steps does the child emerge from it? (3.) To what extent does color perception become developed during the first three years of life? To these questions correspond roughly three stages of the development of color vision in the child. The first is that in which there is no evidence of discrimination and the question to be tested is whether the child really *sees* color or not. Here brightness and contrast must be sharply discriminated from color in order that reactions to color surfaces may not be mistaken for reactions to color, when, in fact they are merely reactions to light. This period extends over the first year and a quarter. In the second period, to be looked for somewhere about the middle of the second year, signs of definite color concepts should appear, if they exist, though this is, of course, quite apart from any ability to understand or use the color names. In the third period, beginning in the latter part of the second year or certainly early in the third, the problem is to ascertain how far the color vision of the child is identical with that of the adult or how far it may still be limited. But few series of experiments have been made on the color vision of young children, those of Prof. Baldwin, covering the ages from 9 to 15 mos. being the first systematic ones. With these the author has compared her own careful experiments and others to which she has had access in manuscript form. The conclusions which she has reached through these data are best given in her own summary.

"The subject is far from being cleared up; but we are at least justified in the following conclusions:

First. The child is insensitive to color at birth and may continue so for several months, though here we have only negative evidence.

Second. Feeble color sensations, beginning at the lower end of the spectrum, and developing progressively upward begin to be felt, certainly within the second half year, and perhaps earlier. These include all the long-wave color sensations by the end of the first year, and probably short wave ones follow soon after, but there is no actual proof of the existence of these before the 18th month.

Third. By the third year, it may be by the latter part of the second, the child has all the color perceptions of the adult, and can be taught to name and discriminate them quite perfectly, and to notice color in the world about him.

Fourth. Colors are seen by the infant more feebly than by the adult as if in a lower illumination. This difference grows progressively less and has nearly disappeared by the third year. It is probably due in part, at least, to the restricted area of the color-sensitive tract of the retina.

Fifth. Pleasure in light precedes pleasure in color; next pleasure

in color appears, depending jointly on their light-richness and their "warmth;" but by the third year the warm colors in some cases lose their advantage, and the cold ones may give as much pleasure. But for color *harmony* no feeling is to be found in the little child."

In this chapter the various space concepts of form, distance, size, direction, locality and solidity, and the child's understanding of pictures are also discussed.

Discrimination in hearing, musical sensibility, sense of rhythm, spontaneous musical expression, and other allied topics, each receive due consideration in the chapter on hearing; touch and the minor dermal senses, taste, smell, muscular, organic, and general sensations are all included among the topics discussed in Part III and the recapitulation of this section, which does not lend itself well to tabulation, is given in 6 month periods, making it exceedingly convenient for reference.

Part IV gives the pedagogical results. These have been foreshadowed by the previous chapters and may be very briefly summarized as follows. In the earliest stage of development, that which comes before grasping, the human presence seems to be the one thing of educational value. As the baby's powers develop the line must be carefully drawn between neglecting to provide necessary stimulus and the danger of overstimulation. In general, the largest possibility of free action is the secret of wholsome and happy development. During the first three years it is in only a slight degree that any formal education can be begun and yet in this period certain psychological foundations for the future may be laid, and a few simple but valuable suggestions are given illustrative of the general principles of such informal instruction.

As a whole the book represents an amount of scientific work and thoroughness that place it in the front rank of psychological investigation.

THEODATE L. SMITH.

Ueber Lesen und Rezitieren in ihren Beziehungen zum Gedächtniss, von L. WITASEK. Zeitschr. f. Psychol. u. Physiol. d. Sin., 44 Bd., 1907, pp. 161-185, 246-282.

Groups of ten nonsense syllables were presented visually at the rate of one syllable per second to seven adult observers, who read them aloud in trochaic rhythm. In reciting a group from memory the observer was given the first syllable, and he attempted to recite the remainder in the same rhythm and at the same rate used in the presentation. In case of failure to recall a given syllable, ten seconds were allowed, and then the correct syllable was given him, with the repetition of which he continued the recitation. Designating the number of successive readings in the presentation of a group by Roman numerals, and the number of successive recitations by Arabic gives the following twelve series of different combinations of readings and recitations that were used.

VI+0	VI+5	VI+10	VI+15
XI+0	XI+5	XI+10	XI+15
XVI+0	XVI+5	XVI+10	
XXI+0			

An hour after giving a series it was re-learned through recitations alone, carried out in the same manner as before and repeated to a point where the observer recited the group in ten seconds without error. We may call these the *re-learning*, and the former the *learning* recitations. The degree of memory induced at any point was measured by the time taken to recite, and by the number of forgotten syllables or number of times aid was required in a recitation.